Chapter 10 Review

1. Explain why the following rational expression is equal to 1 for any values of x and y except $x = 0$ or $y = 0$. Why are $x = 0$ and $y = 0$ impossible values of x and y in this situation?

$$\frac{3x^2y}{3x^2y}$$

2. Malysah is simplifying an expression with lots of exponents. She started by expanding the exponents and then simplified the results. Her steps are shown below. Decide with your team whether she has done the simplification correctly and justify your choice. Look for patterns or possible shortcuts that could help Malysah simplify more quickly and add them to your justification.

$$\left(\frac{m^2p^3}{m^3p^2}\right)^2$$

$$\left(\frac{m^2p^3}{m^3p^2}\right)\left(\frac{m^2p^3}{m^3p^2}\right)$$

$$\frac{m^2p^3m^2p^3}{m^3p^2m^3p^2}$$

$$\frac{m\cdot m\cdot m\cdot m\cdot p\cdot p\cdot p\cdot p\cdot p\cdot p}{m\cdot m\cdot m\cdot m\cdot m\cdot m\cdot p\cdot p\cdot p\cdot p}$$

$$\frac{\cancel{m}\cdot\cancel{m}\cdot\cancel{m}\cdot\cancel{m}\cdot p\cdot p\cdot\cancel{p}\cdot\cancel{p}\cdot\cancel{p}\cdot\cancel{p}}{\cancel{m}\cdot\cancel{m}\cdot\cancel{m}\cdot\cancel{m}\cdot m\cdot m\cdot\cancel{p}\cdot\cancel{p}\cdot\cancel{p}\cdot\cancel{p}}$$

$$\frac{p\cdot p}{m\cdot m}$$

$$\frac{p^2}{m^2}$$

3. Lian, a new student, has just joined your study team. She has not learned about generalizing exponential patterns and does not believe that $\frac{x^m}{x^n} = x^{m-n}$. With your team, use your knowledge of exponents to write a convincing argument for Lian, showing her why this exponential generalization must be true.

4. Light travels so quickly that if it could circle the earth, it would complete about 7.5 trips around the world in one second. If the circumference of the earth is about

24,000 miles, find out how far light travels in one second. Write your answer in standard form and in scientific notation. Show your work.

5. Noelle and Youngji are rewriting an expression that has a fractional exponent. Noelle thinks that $8^{\frac{4}{3}}$ should be rewritten as $\left(\sqrt[3]{8}\right)^4$, and Youngji thinks that it should be rewritten as $\sqrt[3]{8^4}$. Discuss this situation with your study team. Who is correct? Justify your conclusion.

6. Which of the expressions below are equivalent to $-2x^2$? Make sure you find all of the correct answers. Justify your choices.

a. $\sqrt{-4x^4}$ b. $\frac{1}{2x^{-2}}$ c. $(-2x)^2$ d. $\frac{-6x^5}{3x^3}$

e. $\frac{-2}{(2x^2)^{-1}}$ f. $\left|-2x^2\right|$ g. $-\sqrt{4x^4}$

7. Solve $3(\sqrt{(x-1)}-1)=0$ using three different methods: rewriting, looking inside, and undoing. Make sure each team member solves the equation using all three approaches. Be sure to check your solution. Which method do you prefer? Why?

8. Consider the quadratic inequality $x^2-2>7$.

a. How many boundary points are there? What are they? Show them on a number line.

b. How many regions do you need to test? Test each region and determine which ones make the inequality true.

9. Solve the inequality below. Show your solutions on a number line.

$$\left(1+\left|\sqrt{x+3}+4\right|\right)-5\geq 20$$